

# PLAN TUCSON

## Public Comment: Aircraft Noise

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## IS THIS DOCUMENT NECESSARY?

The Planning Commission should not be required to consider substantial new information at the very end of Plan Tucson's public comment period. We regret the need to provide this additional information. However, we are compelled to respond to the comments the Commissioners heard at the May 22 hearing.

Contrary to some of the May 22 comments, we are not unpatriotic. In fact, we support Davis-Monthan. We recognize DM's importance to our community and our nation. We hope Davis-Monthan and the City of Tucson can work together to ensure a bright future for both parties.

## THE AIR FORCE IN TUCSON

### **Davis-Monthan AFB**

DM hosts many operations, which range from two rescue squadrons to a weather squadron, and from a Naval operational center to the Army Corps of Engineers, and from the U.S. Customs Service to the Federal Law Enforcement Training Center.

One operation, that of the 355<sup>th</sup> Fighter Wing, generates most of DM's air traffic. A total of 82 Thunderbolt A-10s are assigned to the 355<sup>th</sup> Fighter Wing.

The A-10s are the quietest fighter jets in America.

Residents of midtown Tucson also hear F-16s over their neighborhoods. The F-16s are not assigned to D-M, but are brought in by Operation Noble Eagle, the 162<sup>nd</sup> Fighter Wing (which is based at Tucson International Airport), and Operation Snowbird.

F-16s are twice as loud as A-10s.

### **Operation Snowbird**

Operation Snowbird brings fighter jets to DM from bases throughout the United States for short-term training. Operation Snowbird also brings squadrons from the air forces of foreign countries for training at DM.

Aircraft visiting DM under Operation Snowbird include A-10s, F-16s, foreign aircraft such as Tornados and Typhoons, and others. Currently, Operation Snowbird aircraft comprise about 4% of all flights in and out of DM.

The Air Force intends to expand Operation Snowbird. The expansion's final Environmental Assessment is expected to be released very shortly.

The expanded Operation Snowbird, which will comprise about 7% of all flights in and out of DM, will bring additional types of aircraft over Tucson's midtown neighborhoods. These will include F-18s and F-22s.

F-18s and F-22s are four times as loud as Davis-Monthan's A-10s.

The expanded Operation Snowbird will constitute a very insignificant fraction of all activities at DM. However, its F-18s and F-22s will be far more disruptive to midtown neighborhoods than any other activity at the base.

If Operation Snowbird were not expanded—or even if it were moved in its entirety to a different location—DM's overall mission, and its contributions to Tucson's economy, would be barely affected.

### **Tucson International Airport**

A total of 65 F-16s are currently based at TIA. Most of them are assigned to the 162<sup>nd</sup> Fighter Wing. As noted above, the F-16s are twice as loud as DM's A-10s.

The Air Force proposes to replace 59 of the F-16s with 72 new F-35s.

F-35s are eight times as loud as A-10s.

The F-35s will be used solely to train pilots. The Air Force has already decided to base the first 72 of its training F-35s at Luke AFB, near Phoenix. It has not yet decided how to apportion roughly 300 additional F-35s among TIA and three other bases. Because none of the four bases has the capacity for more than 72 of these 300 additional F-35s, the likelihood is sizeable that 72 of them will come to TIA.

If the F-35s do not come to TIA, the Air Force's current operations will not be affected. The F-16 missions will continue at TIA just as they are now.

### **Other F-35 Operations**

The TIA-based F-16s fly in and out of DM as part of the pilots' training syllabus. If the F-16s are replaced by F-35s, the F-35s will use DM's flight paths. The F-35s will fly over midtown's residential neighborhoods, some schools, and the University of Arizona. Their path will be very close to the University Medical Center.

Operation Noble Eagle is a tenant at DM. Currently, it rotates several F-16s in and out of the base. Operation Noble Eagle's F-16s are particularly loud, because they often take off directly over the midtown neighborhoods with afterburners on.

The Air Force expects to replace Operation Noble Eagle's F-16s with F-35s. No date has been given.

At the May 22 hearing, the Planning Commission was told that DM's A-10s are expected to remain in service through 2028. That's only fifteen years in the future. What will replace the A-10s in 2028? The F-35 is a prime candidate.

## **AIRCRAFT NOISE**

### **Environmental Studies**

The Draft Environmental Assessment for Operation Snowbird provides little specific information about the impacts of noise that will result from the program's expansion. The Environmental Impact Statement for the F-35 is more specific about impacts. Below, we'll look at some of those impacts.

### **Computers and Throttle Settings**

The F-35 Environmental Impact Study is not based on actual measurements of F-35 noise. Instead, it's based on computer models. (Despite requests from Senator John McCain and then-congresswoman Gabrielle Giffords, the Air Force has refused to fly F-35s over Tucson for demonstration purposes.) We do not know how accurate the Air Force's computer modeling is.

In its modeling of the noise impacts, the Air Force has assumed a throttle setting of 40% ETR. This is a low setting, which produces less noise than higher settings.

As its throttle setting is reduced, an aircraft's air speed is reduced. As its air speed is reduced, the aircraft's stability—its airworthiness—is reduced.

Experienced test pilots have demonstrated that the F-35 can fly at 40% ETR. However, the every-day reality is that the TIA-based F-35s will be used exclusively by pilots who are just learning to fly F-35s. When approaching both TIA and DM, the pilots-in-training will fly over residential neighborhoods and schools. We expect they will opt for the greater stability that higher throttle settings provide. At higher throttle settings, the F-35s will be louder than the Air Force shows in its computer modeling.

In this document, we use the Air Force's information, which assumes 40% ETR throttle setting.

## **NOISE IMPACTS ON NEIGHBORHOODS**

The Air Force tells us that, with a 40% ETR throttle setting, F-35 noise will render the homes of more than 8,000 residents of Tucson "not compatible with residential use." (That phrase—"not compatible with residential use"—is used by the Department of Defense, the Department of Housing and Urban Development, and the Federal Aviation

Administration to characterize properties that are subjected to a noise level of 65 DNL decibels or greater.)

Arizona Revised Statutes impose severe restrictions on any property that is “not compatible with residential use.”

The Air Force has studied fifteen of Tucson’s schools, medical facilities, and churches that will be heavily impacted by F-35 noise. When F-35s fly over these fifteen “representative” institutions, their noise will be so loud that, on average, conversations will be interrupted between eight and thirteen times per hour (depending upon whether windows are closed or open).

How will this affect a doctor who tries to communicate with a patient? How it will affect a classroom of students who attempt to hear their teacher? How it will affect a congregation that tries to listen to a minister’s sermon?

The Air Force has not studied the F-35’s noise impacts on representative homes, apartments, offices, restaurants, or stores. We must assume the impacts will be the same as for the fifteen schools, medical facilities, and churches that the Air Force did study.

## **ECONOMIC IMPACTS**

### **Davis-Monthan’s Positive Economic Impacts**

Davis-Monthan’s Economic Impact Analysis for Fiscal Year 2012 states that DM’s total impact on Tucson’s economy is \$1.64 billion. That figure includes all of Tucson’s military retirees. It also includes the indirect economic impacts of DM.

When comparing various sectors of an economy, and when calculating the total gross domestic product of an economy, economists consider direct economic impacts only. The numbers in DM’s Economic Impact Analysis show that DM’s direct economic impact is \$0.86 billion.

That’s 2.7% of Tucson’s \$32.34 billion gross domestic product.

(The U.S. Department of Commerce has published a sector-by-sector summary of Tucson’s economy for 2011. Nearly all sectors contribute more to our economy than DM does. Waste management, for example, contributes 1.3 times as much as DM.)

Davis-Monthan and its economic impact are here to stay. If the Air Force were to reverse its plans to bring F-18s, F-22s, and F-35s to Tucson, DM’s economic impacts would remain unchanged.

### **Potential Positive Impacts of TIA's F-35s**

The Air Force has not told us the size of the payroll that it expects the F-35s will bring to Tucson. Its Environmental Impact Statement says the F-35s will bring a net increase of 350 personnel to Tucson.

To accommodate the F-35s, appropriate facilities must be constructed at TIA. The Air Force says in its Environmental Impact Statement that construction jobs “would constitute less than 1 percent of the total employment in Pima County,” and “Construction expenditures and the jobs created would be temporary.”

The F-35s will generate some positive economic benefits for Tucson. However, if the F-35s do not come to Tucson, the F-16s will remain at TIA. Payrolls and contracts for supplies and services will not change from their current levels.

### **Potential Positive Impacts of an Expanded Operation Snowbird**

The Air Force has stated that the economic impact of the current Operation Snowbird totals \$383,000 for construction, services, and procurement. The Air Force has said it has no separate accounting of Operation Snowbird's payroll.

Even if its payroll were included, the current Operation Snowbird would comprise an insignificant fraction of DM's \$0.86 billion economic impact.

The Air Force has provided no economic figures for an expanded Operation Snowbird. However, we can expect that even after the expansion, Operation Snowbird will comprise an insignificant fraction of DM's total.

If the Air Force were to abandon its plan to expand Operation Snowbird, its payrolls and contracts for supplies and services would remain at their current level. If the Air Force were to move the entire Operation Snowbird to a different location, the loss of payroll and contracts would have a very negligible effect upon Tucson's economy.

### **Impacts of Aircraft Noise on Property Values**

As noise increases over Tucson's residential neighborhoods, livability decreases. As livability decreases, property values decrease.

The Federal Aviation Administration and consultant Booz-Allen & Hamilton have developed a methodology for evaluating the impact of aircraft noise on housing values. Their study demonstrates that in moderately priced neighborhoods in the vicinity of Los Angeles International Airport, noise has diminished property values by 18.6 percent, or 1.33 percent per decibel.

Another study, prepared for the Orange County Board of Supervisors, shows the loss of property value averages 27.4 percent in the vicinity of the three California airports that were analyzed.

Concurrent with loss of property values is the loss of property-tax revenues.

### **Other Economic Impacts of Aircraft Noise**

According to the U.S. Department of Commerce, Tucson's leisure and hospitality business—its tourist trade—contributed \$1.41 billion in direct economic impacts to Tucson in 2011.

The noise of F-18s, F-22s, and F-35s will disrupt the tranquility of Tucson's restaurants, resorts, hotels, motels, RV parks, golf courses, and surrounding attractions such as Saguaro National Park, Tucson Mountain Park, Old Tucson, and Arizona-Sonora Desert Museum.

Tucson will become a less desirable destination for snowbirds and other visitors. Even a small loss of our visitors' business will more than offset any economic gains that excessively loud aircraft will bring to Tucson.

Our local economy depends in part upon the many people who move from the northern states to Tucson during their retirement years. The noise of loud aircraft will disturb many retirees, and will damage Tucson's reputation as a great place to retire.

The F-18s, F-22s, and F-35s will bring additional economic impacts to the Tucson area, such as the cost of closing or moving schools and other public facilities. (Recent past examples include the closure of Julia Keen Elementary and the \$7 million relocation of Vail Academy and High School due to concerns over aircraft noise and safety.)

Other economic impacts include the cost to taxpayers of acquiring land around DM and TIA for use as a buffer zone against urban encroachment. We taxpayers pay for these land acquisitions through programs such as Pima County's bond funds and Arizona's Military Installation Fund.

## **NOISE IMPACTS ON LIVABILITY**

When very loud aircraft fly overhead, neighborhood residents cannot hold conversations, talk on the telephone, or listen to music or television. They cannot relax outdoors in their gardens or on their patios and decks. The tranquility of their homes is destroyed.

Some of the most desirable neighborhoods in Tucson, such as Colonia Solana, El Encanto, and Sam Hughes, will become undesirable.

Tucson's Planning Commission will be required to address the consequences of homeowners and tenants who move from the affected neighborhoods in order to seek quieter surroundings; the consequences of owner-occupied homes that are converted into rental units; the consequences of lower rents in neighborhoods that become noisier; the consequences of properties that will be allowed to physically deteriorate as pride-of-ownership erodes.

### NOISE IMPACTS ON STUDENTS

A study known as *Hygge et al* (2002) is described by the magazine *Monitor on Psychology* as “one of the most compelling studies in the field of noise pollution.”

The July/August, 2011, issue of *Monitor on Psychology* summarizes the study:

Six months before and 12 and 18 months after the [Munich] airport closed and moved to a distant location, researchers . . . administered tests of reading, memory, attention and hearing to third- and fourth-graders who lived and attended school near the two airport sites. They found that the reading comprehension skills and long-term memory of children near the old airport improved once air traffic moved to the new airport, while the performance of children near the new airport declined.

Following the closure of the old airport, the students' speech perception—their abilities to understand their teachers, classmates, parents, and others—failed to recover. *Monitor on Psychology* describes this:

After the old airport closed . . . [the students'] speech perception remained impaired, says Evans, [one of the authors of the study and] a professor of human ecology at Cornell University.

“We think one thing that might be going on is that children who are exposed to noise develop a stress response of ignoring the noise, but not only do they ignore the noise, there's evidence they also ignore speech,” Evans says. “So not only are they ignoring the stimuli that are harmful, but they're also ignoring stimuli that they need to pay attention to.”

Even though the study found some of the students' skills improved after the old airport closed, this is irrelevant to Tucson students who will be affected by F-35 noise. If the F-35s are based at TIA, they will remain there for decades. Students in the surrounding neighborhoods will be impacted by F-35 noise during their entire academic careers. Their poor academic performance will handicap them for the rest of their lives.

For the students, and for a community that depends on an educated workforce, this will be quite troublesome.

The Department of Defense's *Operational Noise Manual* (2005) states on page 3-20:

There is some evidence that high levels of noise in classrooms can even lead to physiological changes in children. According to Evans (1993), the three principal areas of impact are cardiovascular, cognitive, and personal control. . . . In the short term, the children can cope, but in the long term, they have lower motivation, lower reading scores, and less patience for solving difficult problems.

Another report, which was released in 2011 by the World Health Organization and the European Commission's Joint Research Centre, analyzed a number of epidemiological studies. *Monitor on Psychology* describes the report's findings:

The report . . . confirmed what several psychologists have known for decades: Chronic noise impairs a child's development and may have a lifelong effect on educational attainment and overall health. Numerous studies now show that children exposed to households or classrooms near airplane flight paths . . . are slower in their development of cognitive and language skills and have lower reading scores.

In a comprehensive publication titled *Community Noise* (edited by Berglund and Lindvall; 1995), the World Health Organization compiled the results of more than nine hundred separate studies on the effects of noise upon humans. *Community Noise* determined that students affected by aircraft noise have greater difficulty learning to read. The affected students also have greater difficulty processing information.

DOD's *Operational Noise Manual* lists those students who are most susceptible to the impacts of noise:

- The youngest
- Those with English as a second language
- Any child suffering from a hearing deficiency (including short-term hearing loss from middle ear infections)
- Children starting with below-average academic skills
- Children with Attention Deficit Disorder (ADD)

The Air Force tells us that, of the Tucson residents who will be most impacted by F-35 noise, 88.2 percent are minorities. In Tucson, most minorities are Hispanic. For many of those, English is a second language. As noted directly above, DOD's *Operational Noise Manual* states that students with English as a second language are among those who are most susceptible to the impacts of noise.

Page B-28 of the Air Force's F-35 Draft Environmental Impact Statement says

There is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the WHO and a North

Atlantic Treaty Organization (NATO) working group to conclude that *daycare centers and schools should not be located near major sources of noise*. [Emphasis added.]

For Tucson, this admonition from the Air Force comes too late. Daycare centers and schools are already located beneath the future flight paths of TIA's F-35s, and the F-18s and F-22s that an expanded Operation Snowbird will bring.

### NOISE IMPACTS ON HEALTH

In a comprehensive publication titled *Community Noise* (edited by Berglund and Lindvall; 1995), the World Health Organization compiled the results of more than nine hundred separate studies of the effects of noise upon humans. *Community Noise* found that health effects include:

- Increase in blood pressure and vasoconstriction, which can lead to eventual hypertension and other cardiovascular disorders.
- Elevated levels of chemicals such as catecholamines, which cause cardiac arrhythmias, platelet aggregation, increased lipid metabolism, and damage to arterial linings.
- Higher risk of angina pectoris.
- Alteration of normal sleep patterns at night, which results in increased fatigue, changes in mood, and decreased performance during the day.
- Irritability, instability, argumentativeness, anxiety, nervousness, insomnia.
- Nausea, headache, loss of appetite, reduction in sexual drive.

Children are even more sensitive to the health effects of noise than adults are, according to the findings of *Community Noise*.

*Monitor on Psychology* cites a report released in 2011 by the World Health Organization and the European Commission's Joint Research Centre. The report analyzed a number of epidemiological studies. *Monitor on Psychology* describes the report's findings:

A steady exposure to "noise pollution," the report concludes, may lead to higher blood pressure and fatal heart attacks. . . .

The report also confirmed what several psychologists have known for decades: Chronic noise impairs a child's development and may have a lifelong effect on educational attainment and overall health. Numerous studies now show that children exposed to households or classrooms near airplane flight paths, railways or highways are slower in their development of cognitive and language skills and have lower reading scores.

"There is overwhelming evidence that exposure to environmental noise has adverse effects on the health of the population," the report concludes, citing

children as particularly vulnerable to the effects of chronic urban and suburban racket.

*Monitor on Psychology* summarizes a study known as *Hegge et al* (2002):

Munich students near the airports had significantly higher levels of the stress hormones adrenaline and cortisol and markedly higher blood pressure readings than children in quieter neighborhoods. Evidence suggests that elevated blood pressure in childhood predicts higher blood pressure later in life, and higher levels of stress hormones are linked to several life-threatening adult illnesses, including high blood pressure, elevated cholesterol and other lipids, and heart disease.

The Department of Defense agrees that noise can affect the health of children. DoD's *Operational Noise Manual* (2005) states on page 3-20 that noise can

lead to physiological changes in children . . . the three principal areas of impact are cardiovascular, cognitive, and personal control. Children chronically exposed to noise may suffer from increased cardiovascular activity and this increased activity may reflect direct sympathetic arousal and/or efforts to cope with the interfering effects of noise.

*Monitor on Psychology* notes that noise can impact not just physical health, but mental health as well. Quoting psychologist Arline Bronzaft, PhD, an environmental noise researcher and advisor to four New York City mayors on noise policy:

Noise is a psychological phenomenon. While the ear picks up the sound waves and sends it to the temporal lobe for interpretation, it's the higher senses of the brain that determine whether that sound is unwanted, unpleasant or disturbing, and that's why psychologists need to be heavily involved in this issue.

## MITIGATION

Those who support the Air Force's plans to bring F-35s, F-18s, and F-22s to Tucson have told us that the noise can be mitigated. The supporters propose two types of mitigation.

### Alter Flight Paths

Supporters suggest that flight paths can be altered to route the aircraft away from residential neighborhoods. In fact, following the recommendations of the Military Community Compatibility Committee, DM made some minor adjustments to flight paths several years ago.

The Air Force tells us that additional alterations are not possible. Why not? Because the military flight paths of DM and nearby TIA are tightly interwoven with each other, and with the civilian flight paths of TIA's commercial and general aviation traffic. All the flight paths are interdependent; nothing can be changed.

A retired air traffic controller, who spent his career in the TIA tower and who is sympathetic to the neighborhoods' concerns about aircraft noise, has confirmed to us that the Air Force is correct.

### **Noise Insulation**

Supporters tell us that homes, schools, hospitals, and businesses can be insulated from the noise of loud aircraft. Indeed, TIA has already insulated some homes near the airport.

Noise insulation may work well, so long as we're willing to spend our entire lives indoors, with windows and doors sealed up.

Who will pay for the noise insulation? The Air Force will not. The Department of Defense has an explicit policy of providing no funds for noise mitigation.

Funding must come from local sources. Pima County's Administrator, Chuck Huckleberry, understands this. He has offered to float a \$25 million bond to be used for noise mitigation.

Will Administrator Huckleberry's \$25 million be adequate? A town called Bodo, located in Norway, has the answer to that.

Norway is one of several U.S. allies that will receive F-35s. Norway had planned to assign their F-35s to a base adjacent to Bodo. The government studied the costs required to insulate Bodo's homes, businesses, and schools. The total came to \$1.13 billion. Norway has since decided to assign the F-35s to a different base that will not require sound insulation.

That's \$1.13 billion for a town of 40,000 people. What will the cost be for a city the size of Tucson? We don't know. But we do know that Administrator Huckleberry's offer of a \$25 million bond is hardly a beginning.

### **Effective Mitigation**

If flight-path alteration and noise insulation are not practical, what's the solution? The Netherlands has an answer.

The Netherlands is another ally that will receive F-35s from the U.S. Recognizing that noise will be intolerable to residents who live near the base where F-35s will be assigned, the Netherlands has a very simple solution to mitigation.

The government will demolish the towns of Marrsum and Jelsum, and parts of Leeuwarden.

Here in the U.S., the town of Burlington, Vermont, is currently purchasing and demolishing 150 homes in the vicinity of their airport. The airport is home to 24 F-16s.

Operation Snowbird's F-18s and F-22s will be twice as loud as Burlington's F-16s. TIA's F-35s will be four times as loud.

Perhaps Tucson's best answer to the noise of F-18s, F-22s, and F-35s will be to demolish the impacted areas of our city.

Within a few years, the Planning Commission will have to decide what course to take.

## Appendix

### DECIBELS

#### What are decibels?

Decibels are units of loudness. They're not easy to understand. That's why, in this document, we do not cite the decibel levels of the various aircraft. Instead, we simply compare the loudness of each aircraft against a baseline: DM's A-10. (These comparisons are based on decibel levels provided by the Air Force for each aircraft type at the altitude at which they fly over Tucson's midtown neighborhoods.)

We encourage the Planning Commission to perform its own independent research regarding all the facts of this document. While performing its research, the Planning Commission will encounter decibels. A basic understanding of decibels will be necessary.

The decibel scale is not linear. Instead, it's logarithmic.

What does that mean?

For every ten-decibel increase, a noise becomes twice as loud. For example:

- 80 decibels is twice as loud as 70 decibels
- 90 decibels is four times as loud as 70 decibels
- 100 decibels is eight times as loud as 70 decibels
- 110 decibels is sixteen times as loud as 70 decibels

#### DNL

In both the Operation Snowbird Environmental Assessment and the F-35 Environmental Impact Statement, most measurements of aircraft noise are given as DNL decibels (sometimes referred to as Ldn decibels).

DNL decibels are not direct measurements of aircraft noise. Instead, they're averages of all noise (including aircraft noise) in a specific neighborhood. Noise in the neighborhood is measured at every instant of every day for 365 days. The noise of all those instants are averaged out to yield the neighborhood's DNL decibel level.

Without aircraft, a quiet neighborhood might have a noise level of 55 DNL decibels. If loud aircraft intermittently fly overhead at 110 decibels, the neighborhood's yearlong average might rise to 58 DNL decibels. But it's not the 58 DNL average that bothers us; it's the intermittent 110 decibels that are disturbing.

That's why we must be careful when we're told, for example, that a new aircraft will raise a neighborhood's DNL level to "only" 65 decibels.

### **How loud is it?**

What will an F-35 actually sound like when it flies over Tucson's residential neighborhoods?

As a congresswoman, Gabrielle Giffords was a member of the House Armed Services Committee, and a supporter of the Air Force. She believed it was prudent to let Tucsonans know what an F-35 sounds like, so she asked the Air Force to fly an F-35 over our community. The Air Force refused.

Senator John McCain is a member of the Senate Armed Services Committee, an Air Force hero, and a prime supporter of the Air Force. He asked the Air Force to fly an F-35 over Tucson. The Air Force refused.

If the F-35s won't come to us, perhaps we can go to the F-35s. Mayor Jonathon Rothschild made arrangements with the Air Force to spend two days in Fort Worth TX, where F-35s are manufactured. There, the Air Force would fly F-35s for him, so he could experience their noise level.

On Mayor Rothschild's first day at Fort Worth, the Air Force told him no F-35s were operational. On his second day, the Air Force told him no pilots were available. He returned home to Tucson, mission unaccomplished.

So what does the F-35 really sound like? Mayor Rothschild doesn't know. And, despite requests to the Air Force from Congresswoman Giffords and Senator McCain, the rest of us Tucsonans don't know.